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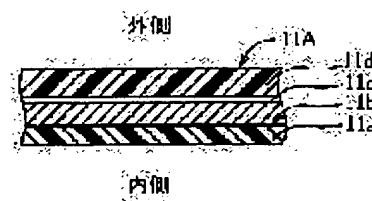
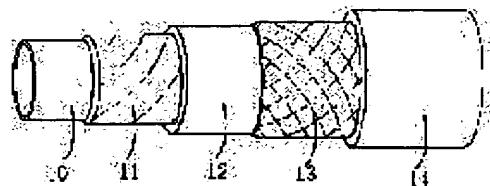
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(54) FLUID NON-PERMEABLE COMPOUND HOSE

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a fluid non-permeable compound hose capable of preventing permeation of a fluid of CO₂ or the like without deteriorating flexibility.

SOLUTION: A hose for a refrigerant CO₂ is constituted by laminating successively from an inner side a rubber inner pipe 10, a cylindrical laminate tape layer 11 formed by winding a laminate tape 11A helically or along the length in the outer periphery of the rubber inner pipe, an intermediate rubber layer 12 provided on the outer peripheral surface of the tape layer 11, reinforcing layer 13 provided on the outer peripheral surface of the rubber layer 12, and a rubber outer pipe 114 provided on the outer periphery of the reinforcing layer 13. The laminate



tape layer 11 is provided with a first fusing layer 11a which is a bonding agent layer laminated in a side of the rubber inner pipe opposing to a metal foil 11b for interrupting a fluid serving as a base and a second fusing layer 11d which is a resin layer laminated in a side of the intermediate rubber layer opposing to that metal foil 11b through a bonding agent layer 11c. By the metal foil 11b, a permeation amount of CO₂ can be suppressed to 1% or less of the in the past. A meal foil layer 11b may be used in lieu of the laminate tape layer.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the fluid nontransparent type compound hose which can prevent transparency of fluids, such as gas which circulates the inside of a rubber hose, and a gasoline, as well as preventing that fluids, such as water, permeate into a hose from the outside of a hose. In detail, it is related with the fluid nontransparent type compound hose which can prevent transparency of methane, a gasoline, etc. very effectively as well as the fluid which is easy to penetrate rubber, for example, the chlorofluorocarbon-replacing material used for an air-conditioner, and a carbon dioxide (CO2).

[0002]

[Description of the Prior Art] The conventional hose for chlorofluorocarbon-replacing material refrigerants was constituted by giving the inside resin layer 1 of the thin meat of a polyamide system to the inner skin of the rubber inner tube 2, and giving the reinforcement layer 3 and the rubber outer tube 4 to a periphery, as shown in drawing 13. However, CO2 which uses a carbon dioxide (CO2) as a refrigerant as a substitute of a chlorofluorocarbon-replacing material while eccrisis suppression of a chlorofluorocarbon-replacing material is called for still more severely from a viewpoint of global warming prevention Development of the hose for refrigerants is called for. However, CO2 It is CO2, in order to pressurize a refrigerant conventionally at high pressure (100kg /cm]2 grade) compared with a chlorofluorocarbon-replacing material, when it considers as a refrigerant. It has the problem of becoming easy to penetrate. Then, although thickening thickness of the inside resin layer 1 of the above-mentioned hose for refrigerants is also considered, it has the problem of spoiling the flexibility of a hose.

[0003]

[Problem(s) to be Solved by the Invention] without this invention is made in view of the above-mentioned trouble and it spoils flexibility -- further -- a chlorofluorocarbon-replacing material and CO2 etc. -- CO2 which sets it as the 1st purpose to offer the fluid nontransparent type compound hose which can prevent transparency of a fluid, and requires pressure resistance further It sets it as the 2nd purpose to offer the fluid nontransparent type compound hose suitably used as a hose for refrigerants.

[0004]

[A The means for solving a technical problem and an effect of the invention] In order to attain the above-mentioned purpose, invention of a claim 1 constitutes the fluid nontransparent type compound hose which is equipped with a rubber inner tube, the metallic foil layer prepared in the periphery of a rubber inner tube, and the rubber outer tube prepared in the periphery of a metallic foil layer, and is characterized by the bird clapper. thus, the metallic foil layer for intercepting a fluid, since it constituted -- a chlorofluorocarbon-replacing material and CO2 etc. -- a fluid can be intercepted effectively

[0005] Moreover, invention of a claim 2 constitutes the fluid nontransparent type compound hose which a band-like metallic foil is wound around the periphery of a rubber inner tube and a rubber inner tube at ******, is equipped with the tubed metallic foil layer by which welding fixing of the matching portion

of the ends of the cross direction of a metallic foil was carried out, and the rubber outer tube prepared in the periphery of a metallic foil layer, and is characterized by the bird clapper. thus, by having constituted, since welding fixing of the matching portion of the ends of the cross direction of the metallic foil layer wound around ***** is carried out, it compares, and the seal nature of a portion fully secures -- having -- therefore, this metallic foil layer -- a chlorofluorocarbon-replacing material and CO₂ etc. -- a fluid can be intercepted nearly completely

[0006] Moreover, a band-like metallic foil is spirally wound around the periphery of a rubber inner tube and a rubber inner tube at ***** , and invention of a claim 3 constitutes the fluid nontransparent type compound hose which is equipped with the tubed metallic foil layer which infixed adhesives in the mating face of the polymerization section of the ends of the cross direction of a metallic foil, and fixed, and the rubber outer tube prepared in the periphery of a metallic foil layer, and is characterized by the bird clapper. thus, by having constituted, since spiral or the superposition side of the ends of the cross direction of a metallic foil layer wound around ***** has fixed through adhesives, the seal nature of the polymerization section secures -- having -- a metallic foil layer -- a chlorofluorocarbon-replacing material and CO₂ etc. -- a fluid can be intercepted effectively

[0007] Moreover, invention of a claim 4 constitutes the fluid nontransparent type compound hose which is equipped with the metallic foil layer prepared in the periphery of a rubber inner tube, the elastic body layer prepared in the periphery of a metallic foil layer, the reinforcement layer prepared on the periphery side of an elastic body layer, and the rubber outer tube prepared in the periphery of a reinforcement layer, and is characterized by the bird clapper.

[0008] Thus, since it constituted, the metallic foil layer for intercepting a fluid is fastened between the rubber inner tube and the elastic body layer inside the reinforcement layer. therefore, a chlorofluorocarbon-replacing material and CO₂ etc. -- the flexibility of a fluid nontransparent type compound hose is securable not to mention the ability to intercept a fluid effectively, suppressing expansion deformation of the direction of a path at the time of fluid pressurization in a reinforcement layer

[0009] Moreover, the tubed metallic foil layer by which the metallic foil band-like to the periphery of a rubber inner tube and a rubber inner tube in invention of a claim 5 was rolled at ***** , and welding fixing of the matching portion of the ends of the cross direction of a metallic foil was carried out, The fluid nontransparent type compound hose which is equipped with the elastic body layer prepared in the periphery of a metallic foil layer, the reinforcement layer prepared on the periphery side of an elastic body layer, and the rubber outer tube prepared in the periphery of a reinforcement layer, and is characterized by the bird clapper is constituted.

[0010] thus, since welding fixing of the matching portion of the ends of the cross direction of the metallic foil layer wound around ***** since it constituted is carried out, it compares, and the seal nature of a portion fully secures -- having -- a metallic foil layer -- a chlorofluorocarbon-replacing material and CO₂ etc. -- a fluid can be intercepted nearly completely furthermore, a chlorofluorocarbon-replacing material and CO₂ etc. -- the flexibility of a fluid nontransparent type compound hose is securable, suppressing expansion deformation of the direction of a path at the time of the pressurization of a fluid in a reinforcement layer

[0011] Moreover, the tubed metallic foil layer which invention of a claim 6 was wound around the periphery of a rubber inner tube and a rubber inner tube spirally [a band-like metallic foil] at ***** , infixed adhesives in it at the mating face of the polymerization section of the ends of the cross direction of a metallic foil, and fixed, The fluid nontransparent type compound hose which is equipped with the elastic body layer prepared in the periphery of a metallic foil layer, the reinforcement layer prepared on the periphery side of an elastic body layer, and the rubber outer tube prepared in the periphery of a reinforcement layer, and is characterized by the bird clapper is constituted.

[0012] thus, since it constituted and spiral or the superposition side of the ends of the cross direction of a metallic foil layer wound around ***** has fixed through adhesives, the seal nature of the polymerization section secures -- having -- a metallic foil layer -- a chlorofluorocarbon-replacing material and CO₂ etc. -- a fluid can be intercepted effectively furthermore, a chlorofluorocarbon-

replacing material and CO₂ etc. -- the flexibility of a fluid nontransparent type compound hose is securable, suppressing expansion deformation of the direction of a path at the time of the pressurization of a fluid in a reinforcement layer

[0013] Moreover, the tubed lamination tape layer in which it was wound around ***** and the lamination tape was formed spirally [invention of a claim 7] on the periphery of a rubber inner tube and this rubber inner tube, The elastic body layer prepared on the periphery side of this lamination tape layer, and the reinforcement layer prepared on the periphery side of this elastic body layer, The 1st weld layer which counters this rubber inner-tube side of this metallic foil with this rubber inner tube at least based on the metallic foil for having the rubber outer tube prepared in the periphery of this reinforcement layer, and the aforementioned lamination tape layer intercepting a fluid, and is laminated, The fluid nontransparent type compound hose characterized by having the 2nd weld layer which counters this elastic body layer side with this elastic body layer, and is laminated is constituted.

[0014] Thus, since it constituted, the lamination tape layer which has a metallic foil for intercepting a fluid is fastened possible [absorption of deformation of a lamination tape layer] between the rubber inner tube and the elastic body layer inside the reinforcement layer. therefore, a chlorofluorocarbon-replacing material and CO₂ etc. -- the flexibility of a fluid nontransparent type compound hose is securable not to mention the ability to intercept a fluid effectively, suppressing expansion deformation of the direction of a path at the time of fluid pressurization in a reinforcement layer

[0015] Moreover, invention of a claim 8 is replaced with the elastic body layer under invention of a claim 7, a middle rubber layer is adopted concretely, and it has the same operation as a claim 7 substantially, and according to a use, it can be made SORIZZO, or can be made sponge, or a middle rubber layer can be chosen, when it is easy to change thickness suitably, and it can change the flexibility of a hose easily. If it is made sponge, deformation of a lamination tape layer can be absorbed more and the flexibility of a fluid nontransparent type compound hose can be raised.

[0016] Moreover, while the lamination tape layer under invention of a claim 7 is equipped with the polymerization section which the crosswise both ends of this lamination tape overlapped, invention of a claim 9 The 1st weld layer which counters this rubber inner-tube side based on the metallic foil which intercepts a fluid, and is laminated, what is characterized by having the 2nd weld layer which counters this elastic body layer side and is laminated, and this polymerization section welding with the heat at the time of vulcanization -- it is -- the polymerization section -- easy -- it can weld -- a lamination tape layer -- an internal fluid -- more -- a fluid -- it can intercept densely

[0017] Moreover, the metallic foil to which, as for invention of a claim 10, the lamination tape layer under invention of a claim 7 intercepts a fluid, The 1st resin layer which counters this rubber inner-tube side of this metallic foil, and is laminated through the adhesives layer, this -- with the 1st adhesives layer laminated on the periphery side of the 1st resin layer The 2nd resin layer which counters this elastic body layer side of this metallic foil, and is laminated through the adhesives layer, this -- since the metallic foil is fastened to the 1st resin layer and the 2nd resin layer by being characterized by having the 2nd adhesives layer laminated on the periphery side of the 2nd resin layer, too much deformation of a fluid nontransparent type compound hose can be suppressed, and breakage of a metallic foil can be prevented

[0018] Moreover, the metallic foil to which, as for invention of a claim 11, the lamination tape layer under invention of a claim 7 intercepts a fluid, The 1st weld resin layer which counters this rubber inner-tube side of this metallic foil, and is laminated through the adhesives layer, It is what is characterized by having the 2nd weld resin layer which counters this elastic body layer side and is laminated through the adhesives layer. The lamination tape which forms a lamination tape layer can be formed simply, and the lamination tape layer which moreover has a metallic foil can be held possible [absorption of deformation of a lamination tape layer] between a rubber inner tube and an elastic body layer. When the 1st weld resin layer and the 2nd weld resin layer are PET and a polyethylene resin desirably, deformation of a lamination tape layer can be fastened for a lamination tape layer having no adhesives possible [absorption] and strongly between a rubber inner tube and an elastic body layer.

[0019]

[Embodiments of the Invention] Hereafter, when a drawing is used and the form of operation of this invention is explained based on an example, drawing 1 - drawing 5 are CO2 of the 1st example. It is a drawing explaining the hose for refrigerants, and is this CO2. One by one, the laminating of the rubber inner tube 10, the lamination tape layer 11, the middle rubber layer 12, the reinforcement layer 13, and the rubber outer tube 14 is carried out, and the hose for refrigerants consists of the insides. The rubber inner tube 10 is 1.5mm in bore 8mmphi and thickness, and is formed using rubber material, such as desirable damp-proof good isobutylene isoprene rubber (IIR), a chlorinated butyl rubber (Cl-IIR), and a brominated butyl rubber (Br-IIR).

[0020] The lamination tape layer 11 winds spirally around ***** lamination tape 10A shown in drawing 3 on the periphery of the rubber inner tube 10, and is formed in tubed. This lamination tape 11A -- CO2 etc. -- 11d of 2nd weld layer which resembles it on the other hand and becomes it from the resin layer in which a thermofusion is possible through adhesives layer 11c while 1st weld layer 11a which consists of an adhesives layer pasted up possible [a thermofusion] laminates on the whole surface of metallic foil 11b for intercepting a fluid laminates, and it is constituted

[0021] And based on metallic foil 11b, lamination tape 11A is arranged and the lamination tape layer 11 is formed as 1st weld layer 11a counters the rubber inner-tube 10 side of metallic foil 11b with the rubber inner tube 10 and laminates, and as 11d of 2nd weld layer counters the middle rubber layer 12 side with the middle rubber layer 12 and it laminates.

[0022] As metallic foil 11b, thickness can adopt desirably foils which are 3-100 micrometers, such as aluminum and copper. Moreover, as 1st weld layer 11a, thickness can adopt desirably hot-melt type (thermofusion type) adhesives, such as an urethane system which is about 0.1-100 micrometers, or an ethylene-vinyl acetate copolymerization object, as well as an emulsion type elastomeric adhesive. Moreover, as 11d of 2nd weld layer, the thickness pasted up on metallic foil 11b through adhesives 11c, such as an emulsion type elastomeric adhesive whose thickness is 0.1-100 micrometers, and an urethane system, can adopt desirably resin layers, such as polyester which is 3-100 micrometers. In addition, 11d of this 2nd weld layer can reinforce the intensity of lamination tape 11A. And the thickness of the whole lamination tape 11A is desirably made by the range of about 6-300 micrometers.

[0023] In more detail the lamination tape layer 11 As desirably shown in drawing 4, it is spirally wound on the periphery of the rubber inner tube 10. Polymerization section 11e which the crosswise both ends of lamination tape 11A overlapped about 1/3 is formed. This polymerization section 11e is this CO2. It welds, when 11d (resin layer) of 2nd weld layer and 1st weld layer (adhesives layer) 11a fuse mutually with the heat at the time of carrying out vulcanization fabrication in one as a hose for refrigerants, and the seal nature of the lamination tape layer 11 is raised. In addition, as shown in drawing 5, the lamination tape layer 11 can roll and form lamination tape 11A in ***** , and can form the crosswise both ends of lamination tape 11A in 11f of polymerization sections which overlapped suitably about 1/5 etc. round etc.

[0024] The middle rubber layer 12 is usually formed by the thickness of 1mm using the same rubber material as the above-mentioned rubber inner tube 10. The reinforcement layer 13 is formed by carrying out a braid using low contraction low ductility thread, such as an aramid filament of 1% or less of paces of expansion. And the rubber outer tube 14 is 1.5mm in outer-diameter 15mmphi and thickness, and is formed by extruding and covering various well-known rubber material, such as ethylene propylene-diene ternary polymerization rubber (EPDM) and a chlorinated butyl rubber (Cl-IIR). In addition, a wire besides reinforcement layers, such as fiber, can be used for the reinforcement layer 13. Moreover, it can wind in the shape of a spiral, and can also form. Moreover, as other examples, a middle rubber layer can be further prepared on the periphery of the reinforcement layer 13, and the reinforcement layer of further others can be prepared between rubber outer tubes.

[0025] CO2 of the 1st example formed as mentioned above It sets on the hose for refrigerants and metallic foil 11b of the lamination tape layer 11 is CO2. It is CO2 in order not to make almost penetrate. The amount of transparency can be held down to 1% or less of the conventional hose. Moreover, by having formed the reinforcement layer which carried out the braid using the aramid thread which is low contraction low ductility thread of 1% or less of paces of expansion on the periphery side of the middle

rubber layer 12, pressure-proofing of a hose is raised to about 5 times of the conventional refrigerant hose, therefore pressure resistance is also fully secured. Furthermore, since it is very thin, metallic foil 11b of the lamination tape layer 11 has the small resistance to bending, and since it is the structure where the lamination tape layer 11 of the middle rubber layer [the rubber inner tube 10 and] 12 is pinched, the flexibility of a hose is secured.

[0026] Below, the 2nd example is explained. CO2 concerning the 2nd example As shown in drawing 6, one by one, the laminating of the rubber inner tube 20, the lamination tape layer 21, the middle rubber layer 22, the reinforcement layer 23, and the rubber outer tube 24 is carried out, and the hose for refrigerants consists of the insides, and is the same as that of the composition shown in the 1st example of the above except lamination tape layer 21.

[0027] The lamination tape layer 21 winds spirally around ***** lamination tape 21A shown in drawing 7 on the periphery of the rubber inner tube 20, and is formed in tubed. 1st resin layer 21b pastes the whole surface of 21d of metallic foils for intercepting fluids, such as CO2 and a chlorofluorocarbon-replacing material, through adhesives layer 21c, and this lamination tape 21A is laminated possible [weld adhesives layer (1st weld layer) 21a *****] on the front face of 1st resin layer 21b. on the other hand, on the other hand, it is alike, 21f of 2nd resin layer pastes up through adhesives layer 21e, and 21g (2nd weld layer) of weld adhesives layers laminates possible [heat weld] on the front face of 21d of metallic foils which is 21f of 2nd resin layer

[0028] And lamination tape 21A is arranged as 21g (2nd weld layer) of weld adhesives layers counters with the middle rubber layer 12 and they laminate, and the lamination tape layer 21 is formed as weld adhesives layer (1st weld layer) 21a counters with the rubber inner tube 20 and laminates.

[0029] As 21d of metallic foils, thickness can adopt desirably foils which are 3-70 micrometers, such as aluminum and copper. Moreover, as adhesives layers 21c and 21e, thickness can adopt desirably hot-melt type (thermofusion type) adhesives, such as an urethane system which is 0.1-100 micrometers, or an ethylene-vinyl acetate copolymerization object, as well as an emulsion type elastomeric adhesive. As 1st resin layer 21b and 21f of 2nd resin layer, resins, such as polyester excellent in intensity and thermal resistance, are employable. Moreover, as weld adhesives layers (the 1st, 2nd weld layer) 21a and 21g, thickness can adopt hot-melt type (thermofusion type) adhesives, such as an urethane system which is 0.1-100 micrometers, or an ethylene-vinyl acetate copolymerization object.

[0030] In more detail the lamination tape layer 21 It is spirally wound on the periphery of the rubber inner tube 20 like the 1st example. The polymerization section which the crosswise both ends of lamination tape 21A overlapped about 1/3 is formed. The polymerization section is this CO2. It welds, when 21g (2nd weld layer) of 2nd weld adhesives **** and 1st weld adhesives layer (1st weld layer) 21a fuse mutually with the heat at the time of carrying out vulcanization fabrication in one as a hose for refrigerants, and the seal nature of the lamination tape layer 21 is raised. In addition, the lamination tape layer 21 can roll and form lamination tape 21A in ***** , and can form the crosswise both ends of lamination tape 21A in 1 / polymerization section which overlapped 5 round.

[0031] CO2 of the 2nd example formed as mentioned above Also in the hose for refrigerants, like the 1st example of the above, the amount of transparency of a carbon dioxide can be held down to 1% or less of the conventional hose, the pressure resistance of a hose is also fully secured, and flexibility is also provided. Moreover, in the 2nd example, since both sides of 21d of metallic foils are sandwiched by the resin layers 21b and 21f and are reinforced, 21d of metallic foils is protected more certainly, and the breakage is prevented certainly. Furthermore, while the seal nature of the lap portion of the lamination tape layer 21 is secured by having formed the weld adhesives layers 21a and 21g in resin layers [21b and 21f] superficies, adhesion with the resin layers 21b and 21f, the rubber inner tube 20, and the middle rubber layer 22 is performed proper.

[0032] Below, the 3rd example is explained. CO2 concerning the 3rd example The laminating of the rubber inner tube 30, the lamination tape layer 31, the middle rubber layer 32, the reinforcement layer 33, and the rubber outer tube 34 is carried out one by one, and the hose for refrigerants consists of the insides, as shown in drawing 8 . Here, it is the same as that of the composition shown in the 1st example of the above except for the lamination tape layer 31 about the rubber inner tube 30, the middle rubber

layer 32, the reinforcement layer 33, and the rubber outer tube 34.

[0033] The lamination tape layer 31 winds spirally around ***** lamination tape 31A shown in drawing 9 on the periphery of the rubber inner tube 30, and is formed in tubed. this lamination tape 31A -- CO2 etc. -- on the whole surface of metallic foil 31c for intercepting a fluid, resin layer (1st weld layer) 31a in which a thermofusion is possible laminates through adhesives layer 31b, and it is 31d of metallic foils -- on the other hand -- being also alike -- through 31d of adhesives layers, resin layer (2nd weld layer) 31e in which a thermofusion is possible laminates, and is constituted

[0034] And lamination tape 31A is arranged as resin layer (2nd weld layer) 31e counters with the middle rubber layer 32 and laminates, and the lamination tape layer 31 is formed as resin layer (1st weld layer) 31a counters with the rubber inner tube 30 and laminates.

[0035] As metallic foil 31c, thickness can adopt desirably foils which are 3-70 micrometers, such as aluminum and copper. Moreover, as adhesives layers 31b and 31d, thickness can adopt desirably hot-melt type (thermofusion type) adhesives, such as an urethane system which is about 0.1-100 micrometers or an ethylene-vinyl acetate copolymerization object, and an ethylene-acrylic-acid copolymerization object, as well as an emulsion type elastomeric adhesive. Moreover, as resin layers 31a and 31e in which a thermofusion is possible, resins, such as PET excellent in intensity, the low temperature performance-proof, and the adhesive property with rubber and a high density polyethylene, are employable.

[0036] In more detail the lamination tape layer 31 On the periphery of the rubber inner tube 30, it is wound spirally and the polymerization section which the crosswise both ends of lamination tape 31A overlapped 1 / suitably [3 grade] is formed. This polymerization section is this CO2. It welds, when resin layer 31a and 31e fuse mutually with the heat at the time of carrying out vulcanization fabrication in one as a hose for refrigerants, and the seal nature of the lamination tape layer 31 is raised. In addition, the lamination tape layer 31 can roll and form lamination tape 31A in ***** , and can form the crosswise both ends of lamination tape 31A in the polymerization section which overlapped suitably 1/5 round etc.

[0037] CO2 of the 3rd example formed as mentioned above Also in the hose for refrigerants, as shown in the 1st example of the above, the amount of transparency of a carbon dioxide can be held down to 1% or less of the conventional hose, the pressure resistance of a hose is also fully secured, and flexibility is also provided. Moreover, in the 3rd example, since both sides of metallic foil 31c are sandwiched by the resin layers 31a and 31e and are reinforced, metallic foil 31c is protected more certainly and the breakage is prevented certainly. Furthermore, when the resin layers 31a and 31e are PET and a high-density-polyethylene resin, as it has an adhesive property with the rubber by the thermofusion and is shown in drawing 8 Since the 1st weld layer by resin layer 31a is formed between the rubber inner tubes 30 and the 2nd weld layer by resin layer 31e is formed between the middle rubber layers 32, it is not necessary to prepare an adhesives layer and structure of the lamination tape layer 31 can be simplified. in addition, in the 3rd example, the resin layers 31a and 31e are omitted, and on the other hand, adhesives layer 31b can be looked like [the whole surface of metallic foil 31c], 31d of adhesives layers can be prepared, and it can also consider as the composition of a request

[0038] Below, the 4th example is explained. CO2 concerning the 4th example As shown in drawing 10 , one by one, the laminating of the rubber inner tube 40, the metallic foil layer 41, the middle rubber layer 42, the reinforcement layer 43, and the rubber outer tube 44 is carried out, and the hose for refrigerants consists of the insides, and is the same as that of the composition shown in the 1st example of the above except metallic foil layer 41.

[0039] As shown in drawing 11 , on the periphery of the rubber inner tube 40, the metallic foil layer 41 winds metallic foil 41a for intercepting fluids, such as CO2 and a chlorofluorocarbon-replacing material, around ***** , and is formed tubed. As metallic foil 41a, thickness can adopt desirably foils which are 3-70 micrometers, such as aluminum and copper. This metallic foil 41a is the matching portion 41a1 of crosswise ends, as shown in drawing 11 . Welding fixing is carried out by the laser equipments L, such as an YAG laser. After carrying out, rolling metallic foil 41a and performing longitudinal lapping, you may perform welding by laser equipment. Moreover, about welding of metallic foil 41a, not only laser

equipment but methods, such as spot welding, ultrasonic welding, and friction welding, can also be used.

[0040] CO₂ of the 4th example formed as mentioned above Since the seal of the metallic foil layer 41 is carried out nearly completely by welding in the hose for refrigerants, it is CO₂ of the above 1st - the 3rd example. The amount of transparency of fluids, such as CO₂ and a chlorofluorocarbon-replacing material, can be further held down to fitness rather than the hose for refrigerants. Moreover, the pressure resistance of a hose is also fully secured and flexibility is also provided.

[0041] It is the polymerization section 41a2 to the ends of the cross direction of metallic foil 41a wound around ***** on the periphery of the rubber inner tube 40 as a modification of the 4th example next as shown in drawing 12. It prepares and is the polymerization section 41a2. Metallic foil 41a is pasted up applying adhesives 42 from the nozzle N of a coater, and the metallic foil layer 41 is formed. About adhesives 42, you may apply to metallic foil 41a beforehand. If compared with the 4th example in a modification, it is the polymerization section 41a2. Seal nature is CO₂ of the above 1st - the 3rd example, although it is slightly inferior. The amount of transparency of fluids, such as CO₂ and a chlorofluorocarbon-replacing material, can be stopped on a par with the hose for refrigerants, and the pressure resistance of a hose is also fully secured, and flexibility is also provided. In addition, instead of *****, a metallic foil is rolled spirally, the polymerization section is prepared in the ends of the cross direction of a metallic foil, adhesives are beforehand applied to a metallic foil, applying adhesives to the polymerization section from the nozzle N of a coater, or you may make it paste up a metallic foil.

[0042] In addition, in each above-mentioned example, although isobutylene isoprene rubber etc. is used for the middle rubber layer, it can replace with this and can also consider as an elastic body layer with rubber cement. Moreover, it can also consider as the elastic body layer using the resin which has elasticity, such as a urethane resin, instead of a middle rubber layer.

[0043] Moreover, in each above-mentioned example, although the middle rubber layer is prepared, a middle rubber layer may be lost and a direct reinforcement layer may be given to a lamination tape layer or a metallic foil layer. Moreover, a reinforcement layer can also be omitted when some intensity of a fluid nontransparent type compound hose may be made low.

[0044] In addition, the fluororubber of the resin layer of thin meat or thin meat can be suitably given to the internal surface of the rubber inner tubes 10, 20, and 30, and it can use as a hose for gasoline circulation etc.

[Translation done.]